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It is frequently necessary to subdivide a current of cold air or gas which is being heated, as in the hot-blast stove or in furnace regenerators. This problem may be solved as follows : Figs. 48 and 49 show a current of .a cold gas circulating through a channel, having walls heated to incandescence. Assume that the stream of cold gas being heated has been equally divided between two

velocities of these two streams are denoted by *ui* and *u>>* and the friction in the two branches in millimeters of water is & and &.

The condition necessary for the maintenance of equilibrium, in this case, is that the increase of the hydrostatic pressure in the two branches *q*| and r/₂ shall be equal. If there were no loss of hydrostatic pressure in impressing the velocities ?/i and *u?* upon the two branches and in overcoming the frictional resistance & and & of the two channels to the passage of the gas, the hydrostatic pressure in millimeters of water in the channel *q*| of a height *h* would be, taking 1.29 kg as the weight of a cubic meter of the furnace gas

at ° °

$$1.29A$$

For the branch q_z, the hydrostatic pressure would be

A part of these increases in the hydrostatic pressure will be expended in overcoming the frictional resistances & and £>, and in impressing the velocities *HI* and *uz* upon the columns of gas. These last losses, in millimeters of water, may be expressed in the following manner :

$$\frac{wi^2}{X}: - \quad 1.29 \quad \text{and} \quad , — \quad uS \qquad 1.29$$

and the condition for the equality of the increases in hydrostatic pressure in the two branches is given by the following equation:

In this equation there are six variables; five of these must be known in order to fix the value of the sixth.

For example, the checker openings around the outside of the checker-work of a Cowper hot-blast stove lose a great deal more

heat by radiation and by the cooling effect of the outside of the stove than the central passes. By reason of this they have a much greater cooling effect upon the current , of hot gases, and therefore the current of gases flowing downward through |l these openings is reinforced, since if fe<*i, ii_2>%. By measuring fe and t_h it is not difficult to find —.

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